



Virginia Controls, Inc.

2513 Mechanicsville Turnpike
Richmond, Virginia 23223

Tel: (804) 225-5530

Fax: (804) 225-0116

email: eng@vacontrols.com

website: www.vacontrols.com

BATTERY OPERATED RESCUE INITIATION SYSTEM

750VA & 1000VA OPERATING MANUAL



Revision 2.1

21 December, 2005

Member of NAEC since 1979

Member of CECA since 1998

Table of Content

1. IMPORTANT SAFEGUARDS.....	3
2. INSTALLATION INSTRUCTIONS.....	4
2.1 General Description.....	4
2.2 Location Factors.....	4
2.3 Storage	4
2.4 Installation	5
3. OPERATION AND TEST INSTRUCTIONS	8
4. DISPLAY AND CONTROL FEATURES	9
4.1 Front Panel	9
4.2 Front Panel Pushbuttons.....	10
4.2.1 On/Test.....	10
4.2.2 Off.....	10
4.3 Power Meter.....	10
4.4 Battery Charge Meter.....	11
4.5 Line Voltage Meter	11
4.6 Front panel Lights	11
4.6.1 AVR Trim	11
4.6.2 On Line	11
4.6.3 AVR Boost.....	12
4.6.4 Overload.....	12
4.6.5 On Battery.....	12
4.6.6 Replace Battery	12
5. BATTERY REPLACEMENT PROCEDURE.....	13
6. TROUBLESHOOTING	15
7. SERVICE	16
8. SPECIFICATIONS.....	17

1. IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:

- Read and Follow ALL safety instructions.
- Please save the Packaging materials. Damage sustained during shipping is not covered under the warranty.
- DO NOT use this equipment outdoors.
- Equipment should be mounted in locations and at a height where it will not readily be subjected to tampering by unauthorized personnel.
- The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.
- DO NOT mount near open flame or sparks.
- DO NOT install equipment in areas of excessive moisture.
- This equipment has an internal energy source (the battery) that cannot be de-energized by the user. The output may be energized when incoming supply power to unit is off.
- Insure disconnect switch "OFF" before connecting and disconnecting this equipment.
- Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in eyes, flush acid with fresh water and contact a physician immediately. The batteries contained within this equipment are recyclable. The batteries contain lead and pose a hazard to the environment and human health if not disposed of properly.
- All servicing should be performed by qualified service personnel.

2. INSTALLATION INSTRUCTIONS

2.1 General Description

BORIS is a fast transfer line-interactive uninterruptible power supply. It is designed to prevent blackouts, brownouts, sags, swells and surges from reaching the protected load under normal conditions. It filters out small utility line fluctuations and isolates the protected load from large disturbances by internally disconnecting from the utility line, while supplying power from its internal batteries until the utility line returns to normal.

While operating on battery, an internal alarm will intermittently beep. The ON/TEST button may be pressed to silence the alarm. If the line utility does not return and the battery continues to power the protected load, a low battery shutdown may occur. Advance warning of a low battery condition begins approximately two minutes before the final shutdown. This alarm will be a continuous beeping sound and cannot be silenced. When used with a Virginia Controls controller, this condition should not occur (if batteries were previously charged fully) since the controller utilizes the remote shutdown capability of BORIS.

Special features include surge protection; EMI/RFI filtering, high and low voltage correction (without draining batteries), as well as automatic battery testing during power up and every 14 days thereafter. User-replaceable batteries can be replaced without having to remove power from the loads.

2.2 Location Factors

BORIS is intended for use in a protected environment. Avoid locations where temperatures exceed 40°C (104°F) or fall below 0°C (32°F) as it will shorten battery life and discharge time respectively. Do not locate BORIS in an environment, which may contain excessive dust, dirt, chemicals, toxic gases, etc. Do not block vents located on the sides of the unit.

2.3 Storage

If it is desired to store BORIS for an extended period, an optional power cord is available which enables the batteries to be charged by connecting the unit directly to a wall outlet (120 VAC). Batteries should be charged for 3 hours every 6 months. Repeat every 3 months in hot locations. Store in a cool, dry environment below 29.4°C (85°F).

2.4 Installation

For any questions relating to the installation of this BORIS unit contact our service department at telephone number (804) 225-5530.

IMPORTANT: Transient voltages, short circuits and grounds can damage BORIS. It is **STRONGLY** recommended that the elevator be installed, and all systems be made operational **BEFORE** BORIS is connected. To run the elevator without BORIS, plug connector labeled "LOAD" into outlet mounted in controller. (This is "As Shipped".) When the elevator is installed, and fully operational, install BORIS as described below.

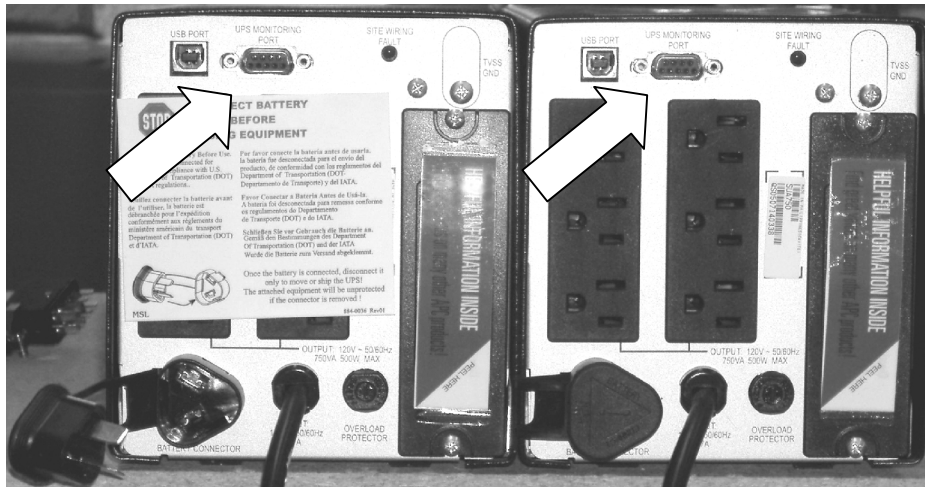
1. Verify that the voltage at terminals B3-B4 is between 110 and 120 VAC.
2. Verify that the utility voltage and frequency on BORIS agree with that listed on the schematics and controller label. This is normally 120 VAC, 60 Hertz.
3. Verify that no changes have been made to the plug wiring.
4. Check the connection of the 4th pole of the Main Line Disconnect Switch. TB-1 & L5 should be closed when the disconnect switch is closed, and open when the disconnect switch is open. This is very important for proper "power up" and "power down" of unit.

NOTE: The BORIS Unit battery has been disconnected for shipment under Department of Transportation Regulations.

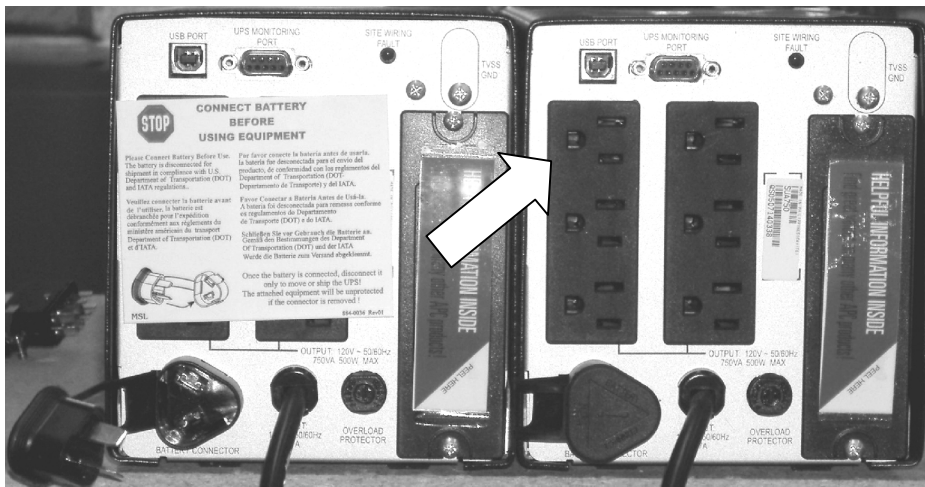
5. Close the "Battery Connector" plug on the back of unit to reconnect battery. (See picture below) The unit on the left is shown with the connector "open." The unit on the right is shown with the connector "closed."



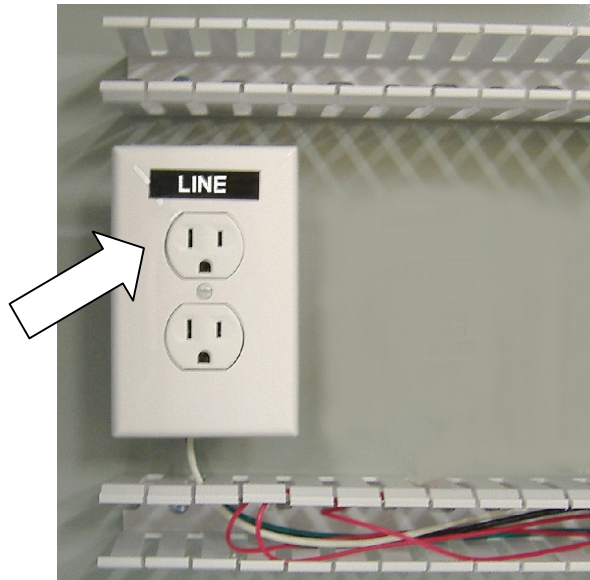
6. With the Main Line Disconnect OFF, place BORIS in the enclosure and plug the 9-pin (D9) connector into the back of BORIS (UPS Monitoring Port). The connector is already wired to the controller.



7. Remove the 3-prong power plug labeled "LOAD" from the outlet box in the controller and plug it into the back of the BORIS unit.



8. Plug in the connector labeled "LINE" into the outlet box mounted in controller.



3. OPERATION AND TEST INSTRUCTIONS

1. Switch the Main Line Disconnect to the "ON" position.
2. Verify the voltage at B3-B4 is 120 VAC. If it is not, check the main controller fuses, transformer wiring and voltages. If there is 120 VAC at B3-B4 but not at B1-B2, check circuit breaker on the back of BORIS; tripped = button extended. If the button is extended then BORIS has been overloaded. Make sure the total load does not exceed the VA rating of the unit. Press button on circuit breaker to reset.
3. When BORIS "powers up", it will beep and the ONLINE indicator will begin to blink. At this time the voltage at B1-B2 should be 120 VAC. In 8 to 10 seconds, BORIS will simulate a power outage and switch to on-battery operation. This is the self-test feature, which ensures proper operation and that the batteries are charged. If the batteries are too weak to support the load during the test, BORIS will immediately return to the on-line operation (the load is not affected). This test will last another 8 to 10 seconds and is completed when the ONLINE indicator stops flashing. If the OVERLOAD indicator illuminates, the load should be reduced before proceeding. If the REPLACE BATTERY indicator illuminates, recharge overnight and test again. If after retesting the indicator remains on, replace the batteries.

CAUTION: If the REPLACE-BATTERY indicator is illuminated, expected on-battery run time may not be provided. (See Section 4, "Display and Control Features" section for more information)

4. To simulate a power outage (for testing purposes), jump TB-1 & L5 then turn off the Main Line Disconnect. Uninterrupted power should now be supplied to the controller (voltage at B1-B2 should remain at 120 VAC). An audible alarm inside BORIS will beep four times every 30 seconds during on-battery operation. The elevator should proceed to the bottom landing and cycle its doors. Three minutes after the elevator has returned and the doors have remained closed, BORIS will turn off to prevent excessive drain on the batteries. When normal power returns, BORIS will automatically "power up" and resume normal operation. Turn the Main Line Disconnect back on to simulate power returning to normal.

IMPORTANT: Remove the jumper from TB-1 & L5 when testing is complete.

NOTE: When less than 2 minutes of backup time remain when running on battery, the audible alarm will sound continuously.

4. DISPLAY AND CONTROL FEATURES



4.1 Front Panel

The **On/Test** button turns on the UPS and also activates the UPS's self-test and utility line voltage displays. (See Section 4.2.1.)

Press the **Off** button to turn off the UPS and the load. (See Section 4.2.2.)

The **Power Meter** display shows the power being drawn by the load. (See Section 4.3.)

The **AVR Trim** LED comes on when the UPS is correcting a high utility voltage condition. The loads receive normal power. (See Section 4.6.1.)

The **On-Line** LED comes on when the UPS is supplying utility power to the loads. (See Section 4.6.2.)

The **AVR Boost** LED comes on when the UPS is correcting a low utility voltage condition. The loads receive normal power. (See Section 4.6.3.)

The **Overload** LED lights when the loads connected to the UPS exceed the UPS's capacity. (See Section 4.6.4.)

The **On-Battery** LED comes on when the UPS is supplying battery power to the loads. (See Section 4.6.5.)

The **Replace Battery** LED comes on when the UPS's battery is no longer useful and must be replaced. (See Section 4.6.6.)

The **Battery Charge/Line Voltage** display shows the present battery charge as a percentage of battery capacity. (See Section 4.4.) It also displays the voltage of the utility line. (See Section 4.5.)

4.2 Front Panel Pushbuttons

4.2.1 On/Test

Pressing this button simulates a utility power outage and causes BORIS to provide power to the controller by deriving power from its internal batteries for 8 to 10 seconds. This self-test verifies both the operation of the BORIS and the condition of the battery.

If BORIS passes the self-test, it returns to on-line operation. If BORIS fails the self-test, it immediately returns to on-line operation and lights the replace battery LED. The loads are not affected.

Charge battery overnight and perform self-test again. If replace battery LED is still on, see Section 5 for information on replacing the battery.

When pressed, this button causes the BORIS on-battery audible alarm to be silenced. When power returns, the alarm is reset so that it will sound during the next power outage. This pushbutton has no effect on the low battery audible alarm, which sounds when 2 minutes of backup time remain.

4.2.2 Off

This pushbutton returns the unit to the "power-up" mode, which puts BORIS through the self-test function, described in Section 3.2 of the "Operational/Test Instructions" section.

4.3 Power Meter

The 5-LED display on the left side of the BORIS unit shows power drawn from BORIS by the load. The display indicates a percentage of BORIS rated capacity. If all five lights are on, then the system should be checked for impending overload condition. See Section 6.

This example shows that the equipment powered by BORIS is drawing between 67% and 84% of rated capacity.

- 84%
- 67%
- 50%
- 33%
- 16%

4.4 Battery Charge Meter

The 5-LED display on the right side of the BORIS unit shows the present charge of UPS's battery as a percentage of the battery's capacity. When all five LED's light, the battery is fully charged. When the lowest LED is flashing, the battery can supply less than 2 minutes of run time for the load.

The example shows the battery charge level between 72% and 96% of full charge.

- 96%
- 72%
- 48%
- 24%
- 0%

4.5 Line Voltage Meter

If the "On/Test" pushbutton is held for 4 to 5 seconds, the lights on the right side of the front panel form a bar graph showing the input line voltage. Note: The UPS will start a self-test as part of this procedure. The self-test does not affect the voltage display.

This example shows the input line voltage to BORIS is between 114 VAC and 124 VAC.

- 133 VAC
- 124 VAC
- 114 VAC
- 105 VAC
- 96 VAC

4.6 Front panel Lights

4.6.1 AVR Trim

This indicator comes on to indicate that the UPS is compensating for a high voltage level. The BORIS automatically corrects high and low voltages so that the loads receive voltage within the normal range.

4.6.2 On Line

This light indicates BORIS is operating normally and power is present at B1-B2. The light blinks when BORIS' self-test feature is initiated at "power up" or when either the Test or Reset buttons are pressed.

4.6.3 AVR Boost

This indicator comes on to indicate that the UPS is compensating for low voltage condition. The BORIS automatically corrects high and low voltages so that the loads receive voltage within the normal range.

To check utility voltage, use line voltage meter. (See Section 4.5)

4.6.4 Overload

This light indicates BORIS is overloaded. If an overload condition lasts for more than 4 seconds, BORIS will sound a constant tone and will be unable to maintain power to the protected load during a power failure. If the overload occurs while on battery power, BORIS will protect itself by turning off. Depending on the severity of the overload, BORIS' circuit breaker may trip.

4.6.5 On Battery

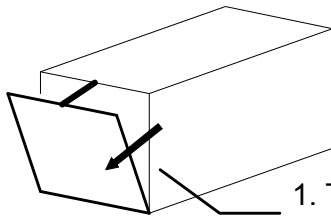
This light indicates BORIS is running on battery and that the utility voltage (building power) is not within a safe operating range for the protected load. The light will remain on for 4 seconds after the utility power is restored. An audible alarm will sound 4 beeps every 30 seconds. Press "On/Test" during on-battery alarms to stop beeping.

4.6.6 Replace Battery

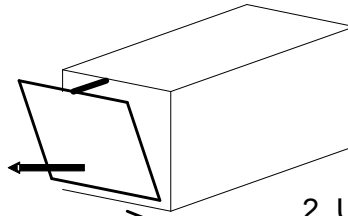
This light indicates BORIS' internal batteries can no longer sustain sufficient charge and should be replaced. This light illuminates as the result of BORIS' self test feature initiated at "power up" or when TEST or RESET buttons are pressed. The light remains illuminated until a successful self-test is run. BORIS will emit short beeps for one minute if the battery fails the self-test. The alarm will repeat every five hours.

5. BATTERY REPLACEMENT PROCEDURE

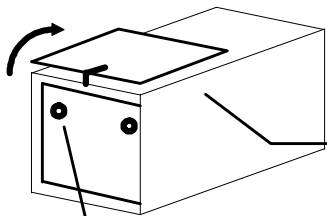
Battery replacement is a safe procedure, isolated from electrical hazards. You may leave the UPS and loads on for the following procedure.



1. Tilt the front cover forward.

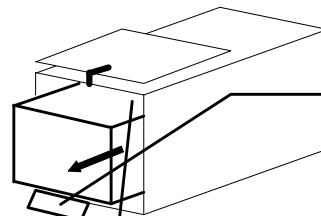


2. Unhook the bottom of the front cover. Do not strain the ribbon cable.



3. Fold the front cover up. Do not strain the ribbon cable.

4. Pull the two battery door plungers and open the door.



5. Grasp the Tab and gently pull the battery out.

6. Disconnect the battery leads. Dispose of the old battery properly. Install the new battery. Reverse steps to complete installation.

1. Grasp the top of the front cover and tilt it out and down.
2. Unhook the bottom of the cover from the chassis and lift it upward to expose the battery door.

CAUTION: Be careful not to strain the ribbon cable. Do not touch the exposed printed circuit board.

3. Fold the front cover on top of the UPS.
4. Pull the two battery door plungers and open the door.
5. Grasp the tab and gently pull the battery out of the UPS.
6. Disconnect the battery leads. Loosen the connectors by gently wiggling them while pulling straight back from the battery connector.
7. Connect the battery leads to the new battery.

NOTE: Small sparks at the battery connectors are normal during battery connection.

8. Connect the red wire to the positive (+) terminal and the black wire to the negative (-) terminal.
9. Dispose of the old battery properly at an appropriate recycling facility or return it to the supplier in the packing material for the new battery. See the new battery instructions for more information.

6. TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	ACTION TO TAKE
BORIS will not turn on.	Circuit breaker on back of unit is tripped.	Reduce load on BORIS unit before resetting (press circuit breaker button).
BORIS operates on battery even though good line voltage is thought to exist.	<ol style="list-style-type: none"> 1. Circuit breaker on back of unit is tripped. 2. Very high, low or badly distorted line voltage may exist. 	<ol style="list-style-type: none"> 1. Reduce load on BORIS unit before resetting (press circuit breaker button). 2. BORIS' <u>Line Voltage Meter</u> may be used to test incoming line voltage.
BORIS "beeps" occasionally.	This is normal.	None. This is due to sags and swells in the line.
BORIS does not provide expected back-up time.	Batteries are weak due to recent utility outage or wear.	Allow sufficient recharge time (normally 8 hours). The batteries will wear faster when used often or at higher temperatures.
All front panel indicators are illuminated and BORIS emits a constant tone.	Internal fault.	Do not attempt to use BORIS. Return for repair immediately. See section 2.4 to run the controller without BORIS.
Low battery light is illuminated and on-line light is extinguished.	BORIS is shutdown and the battery is discharged due to extended usage.	BORIS will return to normal operation when power is restored and battery has recharged sufficiently.
Replace battery light is illuminated.	<ol style="list-style-type: none"> 1. Weak Battery. 2. Replacement Batteries not connected properly. 	<ol style="list-style-type: none"> 1. Allow the battery to charge for at least 8 hours. If problem persists, replace battery. 2. Confirm battery connections. See Section 5.

7. SERVICE

If your BORIS UPS requires service:

1. Use the troubleshooting section (section 6) to eliminate obvious causes.
2. Verify that no circuit breakers are tripped. A tripped circuit breaker is the most common UPS problem.
3. Go to section 4.2.1 and perform a self-test to check the battery.
4. See the front of this manual for the correct telephone number. Call customer service for a return authorization number (RA#).
5. Note the Virginia Controls drawing number (located at the bottom right of schematics). A technician will ask you to describe the problem and help solve it over the phone, if possible, or will give you an RA#.
6. If the UPS is under warranty, normal repairs are covered. If not, there will be a charge for repair.
7. Pack the UPS in its original packaging.
8. It is important to pack the UPS properly to avoid damage in transit.

WARNING: Never use Styrofoam beads for packaging. Damage sustained in transit is not covered under warranty.

9. Include a letter with your name, RA#, return address, description of the trouble, your daytime phone number, and a purchase order number.
10. Mark the RA# on the outside of the package. The factory cannot accept any package without this marking.
11. Return the UPS by insured, prepaid carrier to the address at the front of this manual.

8. SPECIFICATIONS

Input	(750VA) 120V-1Φ- 60Hz; 7A (user resettable circuit breaker) (1000VA) 120V-1Φ- 60Hz; 12A (user resettable circuit breaker)																																							
On Line Operation (Input) Limits	92 VAC-146 VAC; 50-60Hz. (auto-sensing) BORIS automatically maintains consistent output voltage without draining batteries while operating within these limits.																																							
Transfer Time	2 ms. typical, 4 ms. max.																																							
On-Battery Output	115 VAC (±5%); 50/60 Hz (±0.1 Hz); 450W-750VA; 670W-1000VA; sine-wave; overcurrent and short circuit protected, latching shutdown upon overload.																																							
Battery And Charger	Spill-proof, maintenance-free, sealed lead-acid battery with 3 to 6 year typical life expectancy; typical recharge time is 2 to 5 hours from total discharge state.																																							
Operating Environment	0°C-40°C (32°F-104°F) 0-95% humidity (non-condensing)																																							
Dimensions & Weight	(750VA) 6.2"H x 5.4"W x 14.1"D 29 lbs. (1000VA) 8.5"H x 6.7"W x 17.3"D 41.5 lbs.																																							
Typical Run Time Versus Load <i>Fully charged battery at 25°C (77°F)</i>	<table border="1"> <thead> <tr> <th>LOAD</th> <th>TIME (750VA)</th> <th>TIME (1000VA)</th> </tr> </thead> <tbody> <tr><td>250 VA</td><td>26 MIN</td><td>44 MIN</td></tr> <tr><td>300 VA</td><td>20 MIN</td><td>36 MIN</td></tr> <tr><td>350 VA</td><td>17 MIN</td><td>28 MIN</td></tr> <tr><td>400 VA</td><td>14 MIN</td><td>24 MIN</td></tr> <tr><td>450 VA</td><td>11 MIN</td><td>20 MIN</td></tr> <tr><td>500 VA</td><td>9 MIN</td><td>18 MIN</td></tr> <tr><td>550 VA</td><td>8 MIN</td><td>15 MIN</td></tr> <tr><td>600 VA</td><td>6 MIN</td><td>13 MIN</td></tr> <tr><td>700 VA</td><td>5 MIN</td><td>11 MIN</td></tr> <tr><td>800 VA</td><td></td><td>9 MIN</td></tr> <tr><td>900 VA</td><td></td><td>7 MIN</td></tr> <tr><td>1000 VA</td><td></td><td>6 MIN</td></tr> </tbody> </table>	LOAD	TIME (750VA)	TIME (1000VA)	250 VA	26 MIN	44 MIN	300 VA	20 MIN	36 MIN	350 VA	17 MIN	28 MIN	400 VA	14 MIN	24 MIN	450 VA	11 MIN	20 MIN	500 VA	9 MIN	18 MIN	550 VA	8 MIN	15 MIN	600 VA	6 MIN	13 MIN	700 VA	5 MIN	11 MIN	800 VA		9 MIN	900 VA		7 MIN	1000 VA		6 MIN
LOAD	TIME (750VA)	TIME (1000VA)																																						
250 VA	26 MIN	44 MIN																																						
300 VA	20 MIN	36 MIN																																						
350 VA	17 MIN	28 MIN																																						
400 VA	14 MIN	24 MIN																																						
450 VA	11 MIN	20 MIN																																						
500 VA	9 MIN	18 MIN																																						
550 VA	8 MIN	15 MIN																																						
600 VA	6 MIN	13 MIN																																						
700 VA	5 MIN	11 MIN																																						
800 VA		9 MIN																																						
900 VA		7 MIN																																						
1000 VA		6 MIN																																						